



FWP and partner groups search Montana caves for signs of a disease that has killed millions of bats across the United States.

Searching for Something They Don't Want to Find

By Karl Puckett. Photos by Rion-Norris Sanders

“WHEN WE’RE ALL IN THERE, I’ll point out the dangerous spots and nurse you through them.”

On a chilly early April morning, David Bobbitt is providing safety advice for several people snowshoeing to Lick Creek Cave in search of bats and signs of a bat-killing fungus moving across the eastern and central United States. This remote cave is deep in the Helena–Lewis and Clark National Forest near the Highwood Mountains east of Great Falls. Bobbitt, a geologist and cave manager for the national forest, warns that conditions will be dark, wet, and icy, and that ropes could be slippery. If someone is injured in the cave, it will take “a few days” for a search-and-rescue unit to arrive, he says. Then he makes sure each team member carries three flashlights or other light sources. “You don’t want to be stuck down there for days in the dark.” ▶▶

INTO THE BAT CAVE Roughly 100 feet underground in Lick Creek Cave near Great Falls, wildlife biologists and technicians unload gear used to test for the fungus that causes white-nose syndrome in bats. The disease has ravaged bat colonies across the eastern United States and is steadily moving west.

Members of the crew strap on snowshoes, hoist 30-pound packs, and set off into the forest from a county road. After an hour of trudging through knee-deep snow, they arrive at a hole in the ground no bigger than an oven door. Crew members don helmets and swap snowshoes for knee pads before descending a rope—one by one—through the narrow opening. For the next five hours, they climb over jagged rock, scoot on their haunches, and even belly crawl to reach deep into the bowels of the cave. This is no place for the claustrophobic.

The crew is looking for signs of *Pseudogymnoascus destructans*, a fungus that causes white-nose syndrome (WNS) in bats. The disease has wiped out millions of hibernating bats in 33 states and seven Canadian provinces since it was first discovered in New York state in 2006.

Over the past 13 years, WNS has steadily moved westward, spread from bat to bat and possibly by recreational cavers and others who travel from cave to cave.

Last May 2019, it showed up in North Dakota, just 170 miles from the Montana border. The disease will inevitably arrive in Montana, if it's not here already, says Lauri Hanauska-Brown, chief of Montana Fish, Wildlife & Parks' Nongame Wildlife Bureau and a member of the Lick Creek Cave crew. She and other wildlife officials say that early detection may help decrease the spread and keep bat mortality as low as possible.

The visit to Lick Creek Cave is part of a statewide surveillance effort that began in 2012 and includes trips to remote caves throughout Montana to collect samples from bats and soils. "The clock is ticking," says Dan Bachen, senior zoologist with the Montana Natural Heritage Program. "We need to know as much as possible about bats and where they live so that when white-nose syndrome gets here, we're ready to monitor any changes in individual bats and bat populations."

BAT BENEFITS

At stake are not just bats, but also ecosystems and agriculture. In other parts of the

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INTO THE UNDERWORLD Above: David Bobbitt with the U.S. Forest Service works his way down to the oven door-sized hole that leads into Lick Creek Cave. Below: The cave is one of only eight in Montana that hold more than 50 bats each winter. Nats congregate in these "hibernacula," making the caves prime areas for the fungus causing white-nose syndrome to spread.



United States, native plants depend partly or wholly on certain bat species to pollinate their flowers. Some fruit plants rely on fruit-eating bats to spread their seeds.

But it's their insect-eating capabilities that make bats invaluable to people and farm economies. A single little brown myotis bat can consume up to 1,200 mosquitoes in an hour.

In addition to mosquitoes, which can carry West Nile Virus, bats eat agricultural pests. One Indiana study found that 150 big brown bats consumed roughly 1.3 million insects per year, many of them harmful to crops. Ian Foley, Pest Management Program manager for the Montana Department of Agriculture, says bats in Montana consume Hessian flies, orange blossom wheat

midges, and cutworm moths that afflict wheat, corn, fruit trees, and nurseries. Nationwide, the value of bats in pesticide savings is estimated in the billions of dollars.

Montana is home to 15 bat species, some of which reside here year round while others migrate to Mexico and southern states in winter. During the day, bats roost in attics, caves, and talus slopes, and under bridges. For winter roosts (known as "hibernacula"), they seek deep caves where temperatures remain just above freezing.

Bats are one of the few animal species that use echolocation, by which they navigate to points as minuscule as a hair's width by emitting a sound and listening to its reflection. This allows the winged mammals to hunt and eat insects in the dark, when

rival bug-eating birds are asleep. By occupying an airborne ecological niche few other animals use, bats have evolved over the past 50 million years to be one of the world's most abundant and diverse orders of species.

Many people mistakenly assume that bats, which resemble mice with wings, are related to rodents. Actually, shrews, which are not rodents, are closer relatives.

Bats are the only mammal that can truly fly (northern flying squirrels glide). Like grizzly bears, bats live a long time. Several banded in 1989 in Montana's Pryor Mountains were recently recaptured, 30 years

later. Also like grizzly bears, bats produce only one or two young ("pups") each year. If a colony is wracked by disease, it can take decades for numbers to recover.

That's been the case elsewhere in the United States, where WNS has killed between 5 million and 7 million bats.

STARVING TO DEATH

White-nose syndrome takes its name from the fungus—similar to severe athlete's foot—that often shows up on the face of afflicted bats. The fungus seems to have originated in Europe, where it has been less harmful to bats, perhaps because they have

had much longer to adapt. People likely carried WNS to North America on clothes or caving gear.

Fungal infestations grow over the winter in the cool, damp environments of caves, making hibernating bats especially susceptible. In addition to the face, the fungus attacks bare skin on the animals' forearms. Symptoms worsen, wearing holes in the bats' wings. The irritation also arouses bats from their winter torpor. Grooming the affected areas burns up precious calories, resulting in starvation. In some eastern states, the disease has wiped out entire colonies. Emily Almberg, FWP disease ecologist, says there currently is no way to treat infected bats or prevent infestations, though researchers nationwide are searching for treatments.

No one knows how WNS will play out in the West, Almberg says. One major question is whether it will be as devastating here. Back East, tens of thousands of bats commonly hibernate in massive caverns. In Montana, only a handful of caves contain even a few hundred roosting bats. One is Lick Creek, which biologists estimate holds just over 150 bats each winter. Included are the Townsend's big-eared bat, western small-footed bat, long-legged myotis, fringed myotis, and little brown myotis. "The fungus may not thrive in the places where our bats hibernate," Almberg says. "Or it may not spread as quickly or extensively among bats hibernating in smaller groups or that are more dispersed as they are in Montana. These are things we're hoping will work in favor of our bats."

As for treatments, disease ecologists and wildlife biologists are investigating the possibility of placing ultraviolet light near roosting entrances, Hanauska-Brown says. That quick exposure may be enough to kill the fungus. Also under investigation is applying anti-fungicide to the floors and walls, perhaps with drones. A third potential solution is applying a vaccine. "You couldn't vaccinate bats one at a time, but the vaccine could be transmitted in a dust sprayed into hibernacula. Assuming it would get on their fur, they would ingest it as they groom themselves," Hanauska-Brown says.

Each possible means of fighting WNS carries risks. A fungicide could also kill important native cave fungi. Ultraviolet



CAVE DWELLERS Lauri Hanauska-Brown, chief of the FWP Nongame Wildlife Bureau, removes materials she and others will use to test soil and capture and test species including the Townsend's big-eared bat, western small-footed bat, long-legged myotis, fringed myotis, and little brown myotis (below). FWP and the U.S. Forest Service have worked with the caving organization Northern Rocky Mountain Grotto to locate and access caves that need to be surveyed. "The caving community has been essential in helping us monitor for white-nose syndrome," Hanauska-Brown says.



bulbs could harm other cave-dwelling wildlife species vulnerable to that light spectrum. “It’s like those warnings in prescription drug commercials on TV, ‘Side effects may include...’” Hanauska-Brown says.

Despite the lack of proven treatments, Almborg says knowing where bats and WNS exist in Montana will allow for rapid action if scientists ever do discover a cure.

PARTNERS MOBILIZE

One silver lining to the impending WNS crisis is that it compelled partners to study bats in Montana like never before. Working with FWP to monitor WNS are the Montana Natural Heritage Program, U.S. Geological Survey National Wildlife Health Center, U.S. Forest Service, U.S. Fish & Wildlife Service, Bureau of Land Management, Department of Environmental Quality, and Northern Rocky Mountain Grotto, a caving group (see sidebar, below). The partners began meeting in 2010. “We knew WNS was heading west and wanted to begin bringing everyone together to conserve bats wherever it was possible,” Hanauska-Brown says.

Teams began checking caves for bats in 2011 and now know where many of the



UNDERSTANDABLY CRANKY Woken from its winter slumber, a little brown myotis bat hisses as its fur is rubbed with a cotton swab (which later tested negative for the fungus). In eastern states, white-nose syndrome has killed millions of bats. The fungus attacks the flying mammals’ face and the bare skin on their forearms, wearing holes in the wings. It also produces severe skin irritation, causing hibernating bats to wake and groom the affected areas, expending precious calories that results in eventual starvation.

mammals live and in what concentrations. “It’s difficult to work on species that could face some pretty tough challenges without knowing much about them,” Bachen says. “At least now we have enough information to manage them to the best of our ability.”

Researchers found that most of the state’s 400 caves don’t have high numbers of hibernating bats. In fact, only eight contain more than 50 roosting bats. Bats also

roost below bridges and in cliff crevasses, buildings, and constructed bat houses, but these are primarily summer roosts. Five caves used for hibernation were selected for WNS monitoring. Hanauska-Brown says results will help inform cave management decisions to limit the spread of the fungus, such as developing access and decontamination protocols for cavers and others who visit the sites.

Cavers, FWP, and USFS team up to help bats

A major challenge for scientists trying to monitor bats for white-nose syndrome (WNS) is finding and accessing caves where the winged mammals live. “Most of us don’t have experience in those underground environments,” says Lauri Hanauska-Brown, chief of the FWP Nongame Wildlife Bureau.

In 2010, as WNS began rapidly moving west from eastern states, Hanauska-Brown reached out to members of the Northern Rocky Mountain Grotto. The organization of cavers promotes cave exploration, appreciation, and conservation. “We knew the caving community had information we needed, like cave locations, which caves had bats, and how to access caves safely,” she says.

Zach Angstead, membership and engagement coordinator for the Montana Wildlife Federation and vice president of the Grotto, says the caving group welcomed the chance to partner with FWP and the U.S. Forest Service (USFS). “We were concerned they wanted to shut down the caves, but we also wanted to help keep bats safe by decontaminating our clothing and gear and observing where bats live,” he says.

Over the past nine years, USFS and FWP officials have met regularly with the cavers, attending the group’s annual meeting and providing regular updates on bat conservation and WNS. “One way we’ve built trust with the caving community is by making sure they are always in the room whenever we have discussions with the USFS and other partners,” says Hanauska-Brown.

Angstead agrees, and notes that exposure to bat-related information has made converts of him and his fellow cavers. “At first our main concern was just maintaining our access,” he says. “But now we see that bats are part of the cave environment, and we want to do all we can to protect them.”



INTACT MEMBRANE Hanauska-Brown checks the wing of a bat for signs of white-nose syndrome. So far, the disease has yet to show up in Montana, though it was recently documented in North Dakota just 170 miles east of the border. Officials with FWP and other agencies are documenting where bats live in the Treasure State so that if—or, more realistically, when—WNS arrives, they can move quickly to limit its spread and harm to Montana’s bat populations.

BACK UNDERGROUND

Halfway down Lick Creek Cave, Hanauska-Brown says she hopes to collect 25 swab samples on this visit. “We will certainly wake up a lot of bats today,” she says in a whisper. The temperature inside is about 40 degrees; the air is thick with humidity.

One by one, team members squeeze through a foot-high passage on their bellies. At other spots, they use ropes to drop to different cave levels. Finally, they reach the “cathedral,” a massive open space of roughly one acre with a ceiling that rises up to 100 feet in places. To illustrate how dark it is, Bobbitt asks everybody to switch off their helmet lights. “Sit down first,” he

warns, “or you may lose your bearings and fall over.” The darkness is absolute; no one can see their hand in front of their face.

With her headlamp back on, Hanauska-Brown uses a paper cup taped to the end of a hiking staff to gently pluck a little brown myotis off a wall eight feet overhead. Aroused from its sleep, it hisses. “I’m sorry, guy,” she says to the bat while holding it in her gloved hand, its tiny open mouth revealing sharp white teeth.

Hanauska-Brown illuminates it with her headlamp and works quickly. Once awakened from its winter torpor, a bat’s metabolism speeds up, forcing it to burn calories essential for surviving the rest of hiberna-

tion. As she will for the other bats captured this day, Hanauska-Brown brushes a cotton swab over its nose before putting the tiny creature near the cave wall, where it will climb back to its hibernation spot. “If there’s fungus on his little body, it’s now on this swab,” she says.

Later biologists learned that this bat and all the others they sampled last spring in Lick Creek and three other Montana caves were free of the fungus. For now.

“To tell you the truth, I was surprised the fungus didn’t show up,” says Hanauska-Brown. “We’ll be back next spring, and none of us will be shocked one bit if we find it then.”

